

# Advancing our understanding of biological invasion-biodiversity relationships using imaging spectroscopy

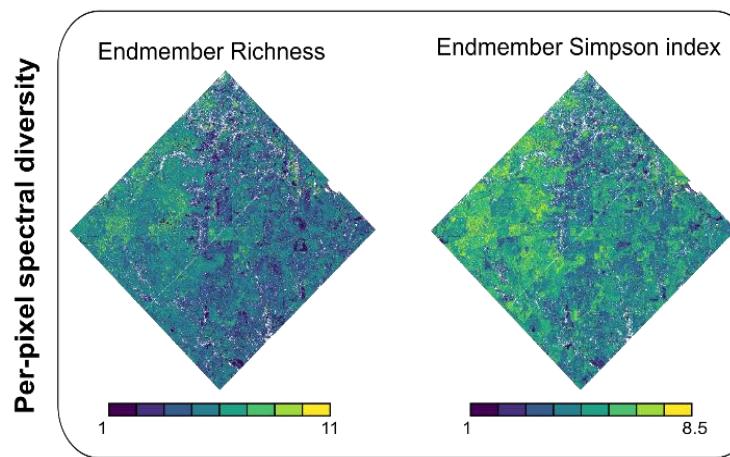
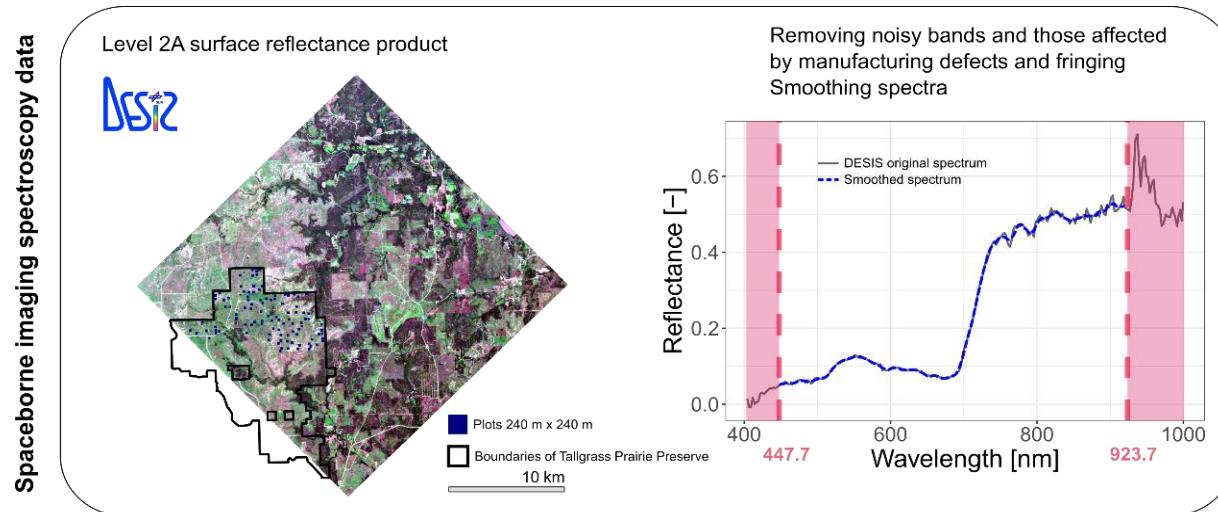
Hamed Gholizadeh  
Oklahoma State University



NASA NIP

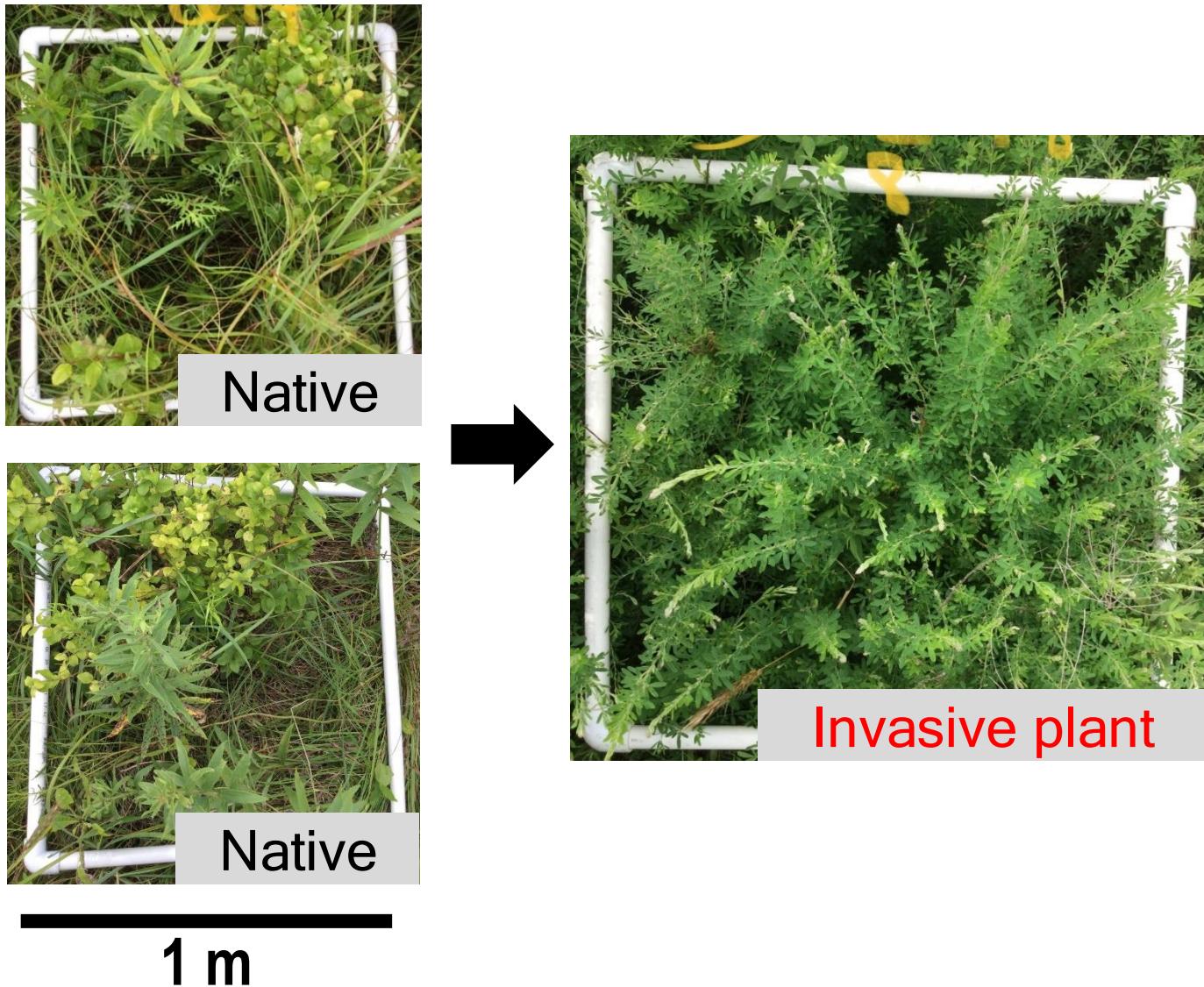
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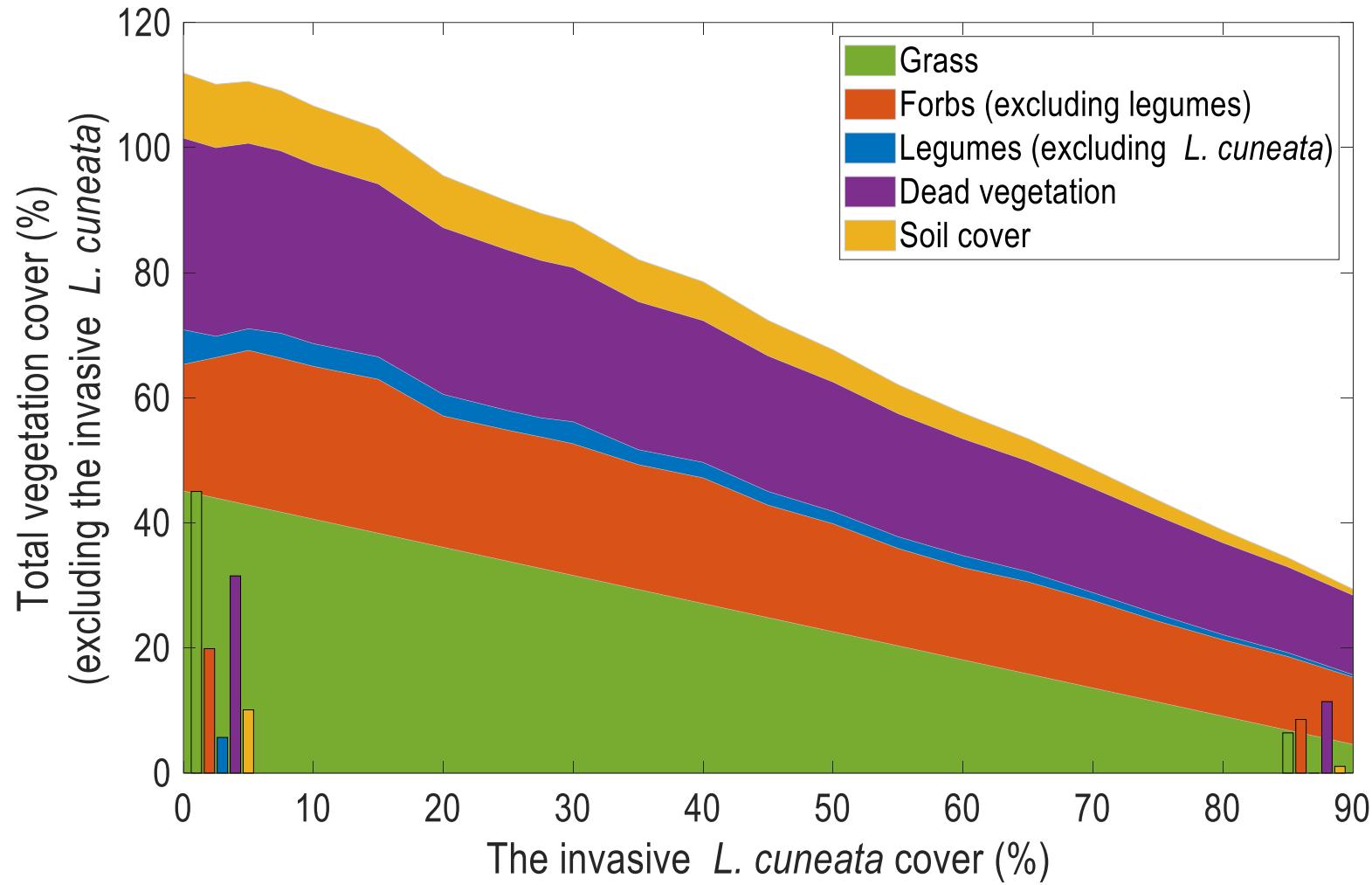
# We use airborne and SBG-like spaceborne imaging spectroscopy to monitor plant diversity



Dr. Christian Rossi

# Focus of this talk: Biological invasion-biodiversity associations



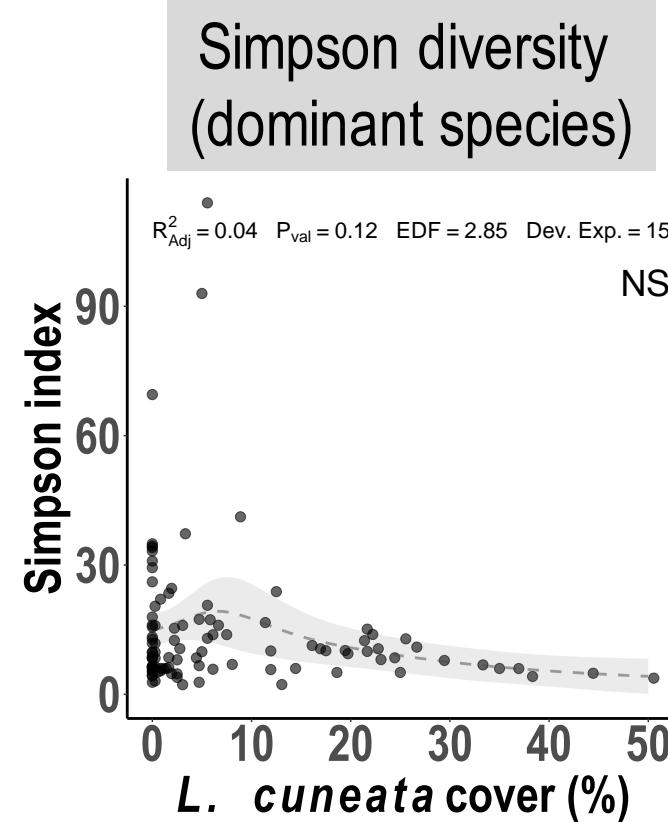
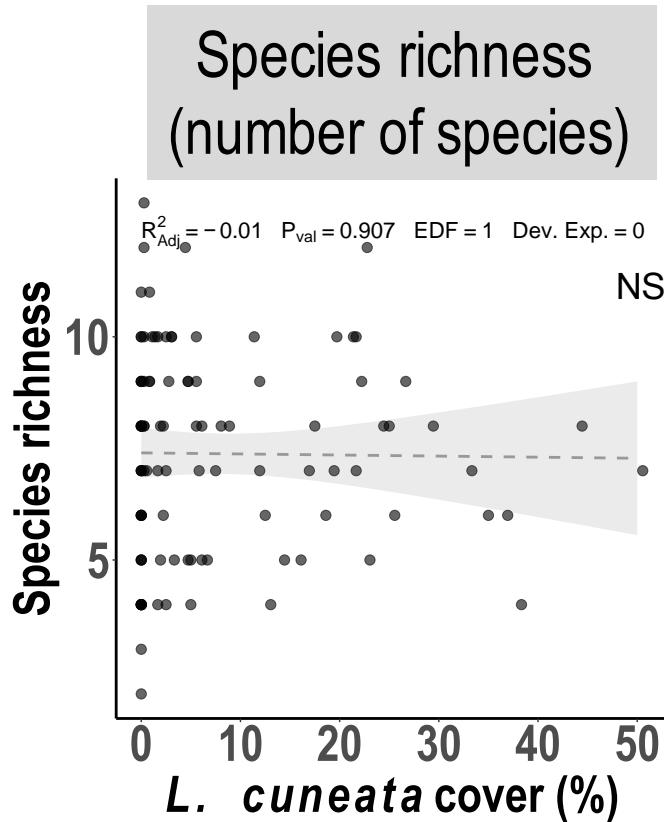


*Lespedeza cuneata* (*L. cuneata*)



# What is the issue here?

Biodiversity-invasion linkages are often assessed using **taxonomic diversity** while ignoring other dimensions of biodiversity.



Ny Aina Rakotoarivony



# **Vive la différence: plant functional diversity matters to ecosystem processes**

Sandra Díaz and Marcelo Cabido

“There is a growing consensus that functional diversity, rather than species numbers per se, strongly determines ecosystem functioning.”

“Species invasions illustrate how a minimal increase in species richness (usually by one species) can drastically change ecosystem processes...”

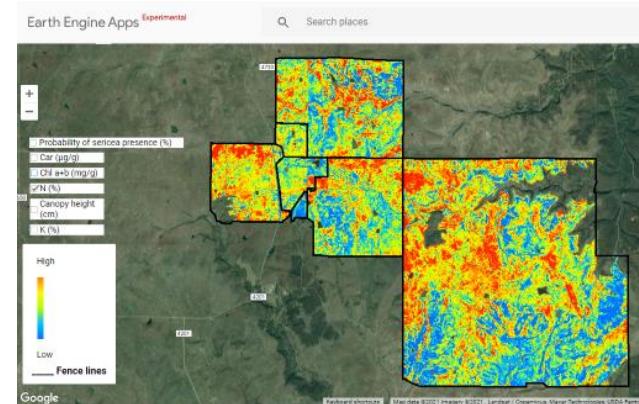
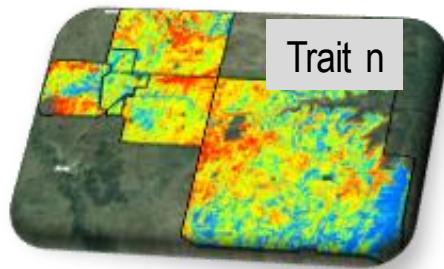
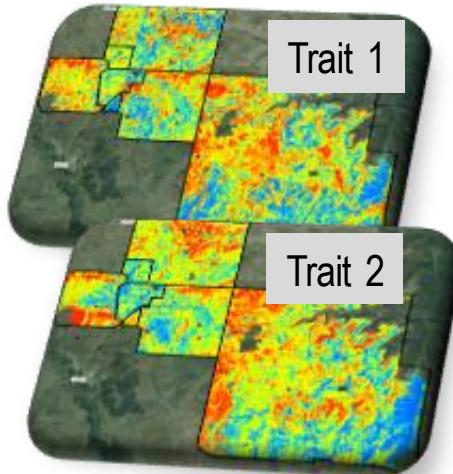
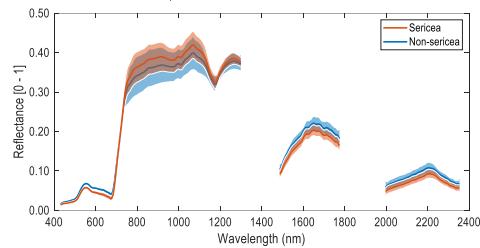
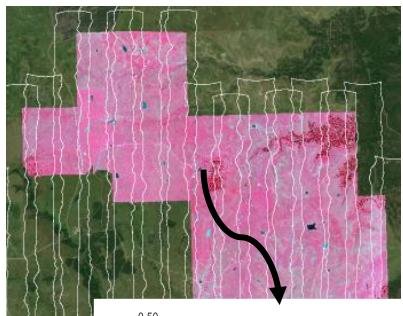
\***Functional diversity:** variability in plants characteristics or “functional traits.”

# What role can remote sensing play? Estimate functional traits and functional diversity

Imaging spectroscopy  
(and in-situ data)

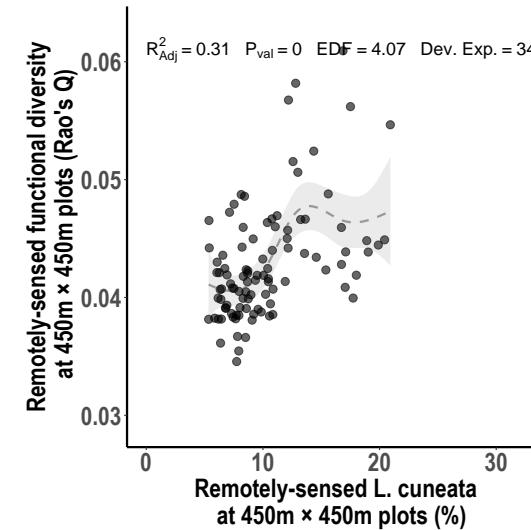
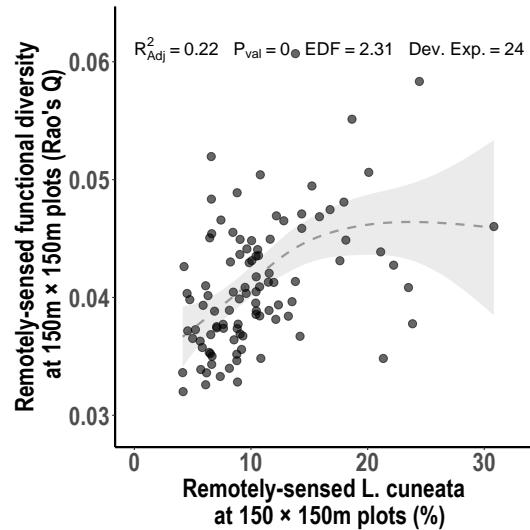
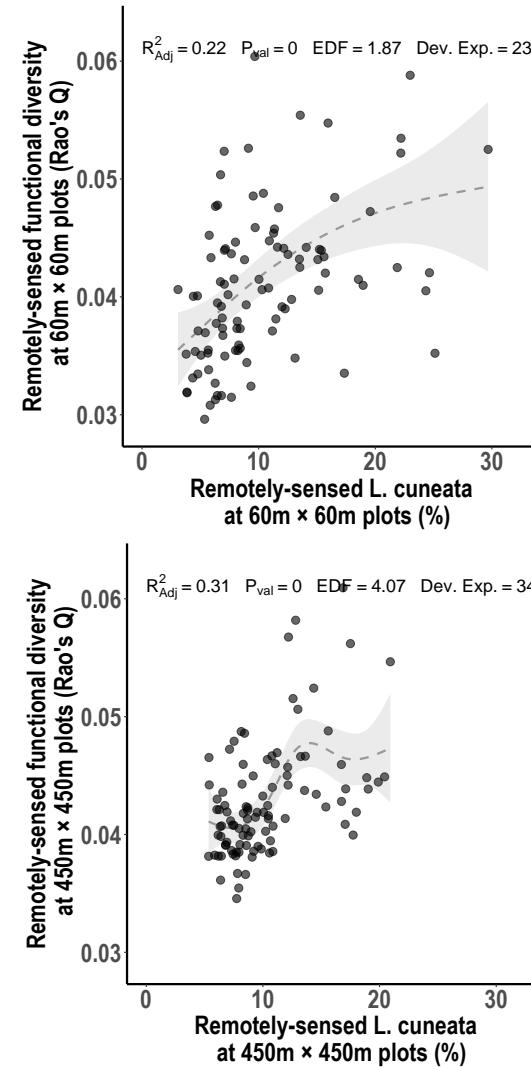
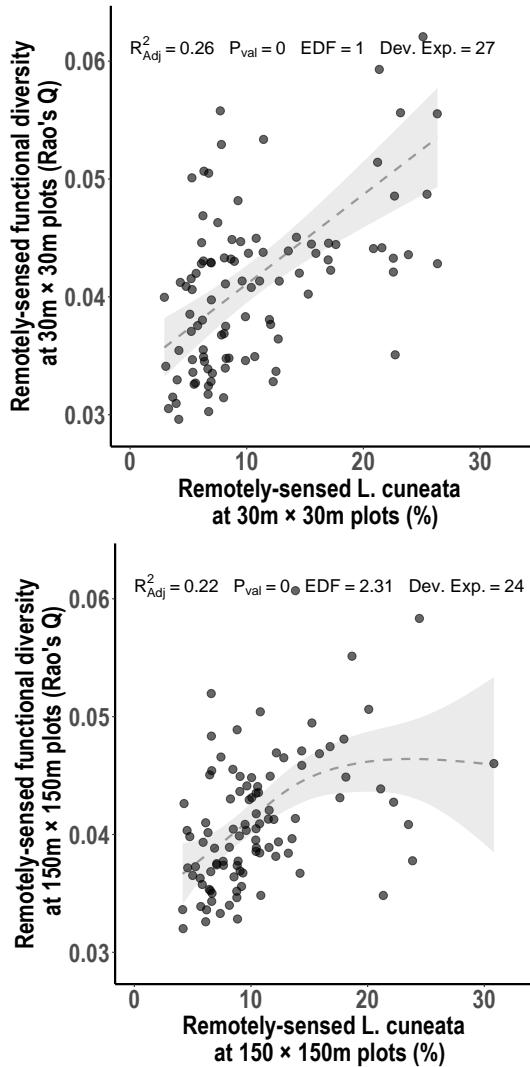
Remotely-estimated  
functional traits

Remotely-estimated  
functional diversity



# What other roles can remote sensing play?

## Advancing our understanding of biological invasion-biodiversity relationships across large spatial extents



What other roles can remote sensing play?  
Advancing our understanding of biological invasion-biodiversity  
relationships across large spatial extents

THE INVASION PARADOX: RECONCILING PATTERN AND PROCESS  
IN SPECIES INVASIONS

J. D. FRIDLEY,<sup>1,10</sup> J. J. STACHOWICZ,<sup>2</sup> S. NAEEM,<sup>3</sup> D. F. SAX,<sup>4</sup> E. W. SEABLOOM,<sup>5</sup> M. D. SMITH,<sup>6</sup> T. J. STOHLGREN,<sup>7</sup>  
D. TILMAN,<sup>8</sup> AND B. VON HOLLE<sup>9</sup>

## Key considerations

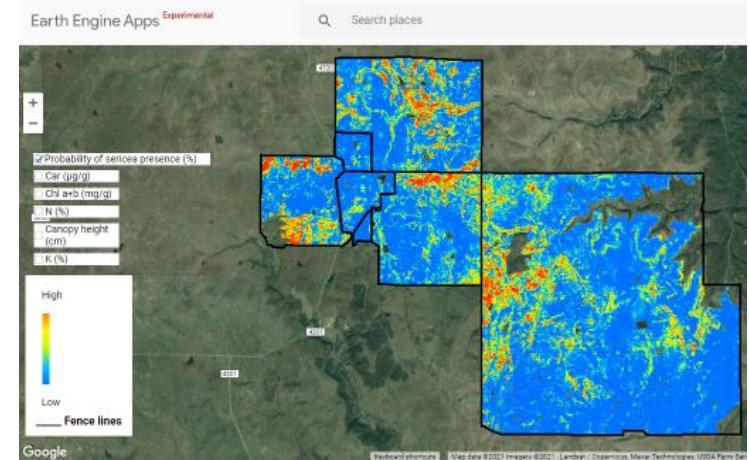
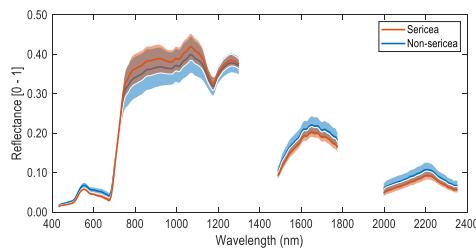
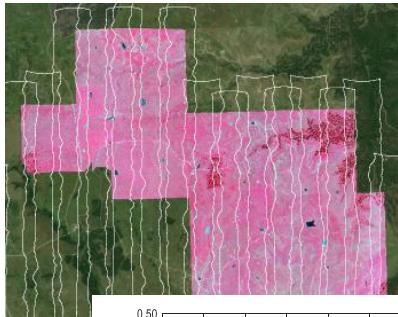
- Observational study design vs. experimental study design
- Not all functional traits are remotely-observable
- There are many ways to quantify functional diversity
- Uncertainty associated with image analysis chain



Remote sensing data



Biological invasion-biodiversity  
associations





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